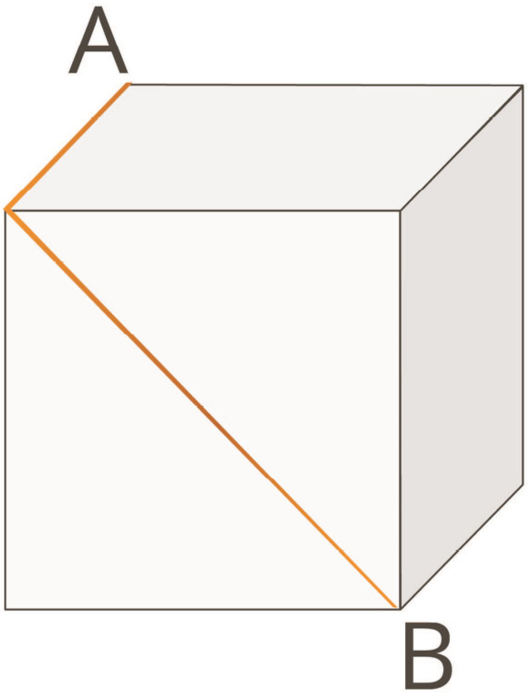
UNIT 0

Essential Pre-Requisite Unit

Lesson 0.1: Getting Started - Thinking Like a Mathematician

The three Explorations of this section are meant to "get you started" on the right track regarding the expectations of this text. These three Explorations of Lesson 0.1 are designed to be accessible to you no matter what your mathematics background is at this point. This text is meant to accompany a mathematics course that, among other things, is about "thinking." Starting with Lesson 1.1, it is our intention that the activities presented within will entice you to think deeply about the mathematics of precalculus, about new ideas presented, and about the connections between the two. With this in mind, let's get started.

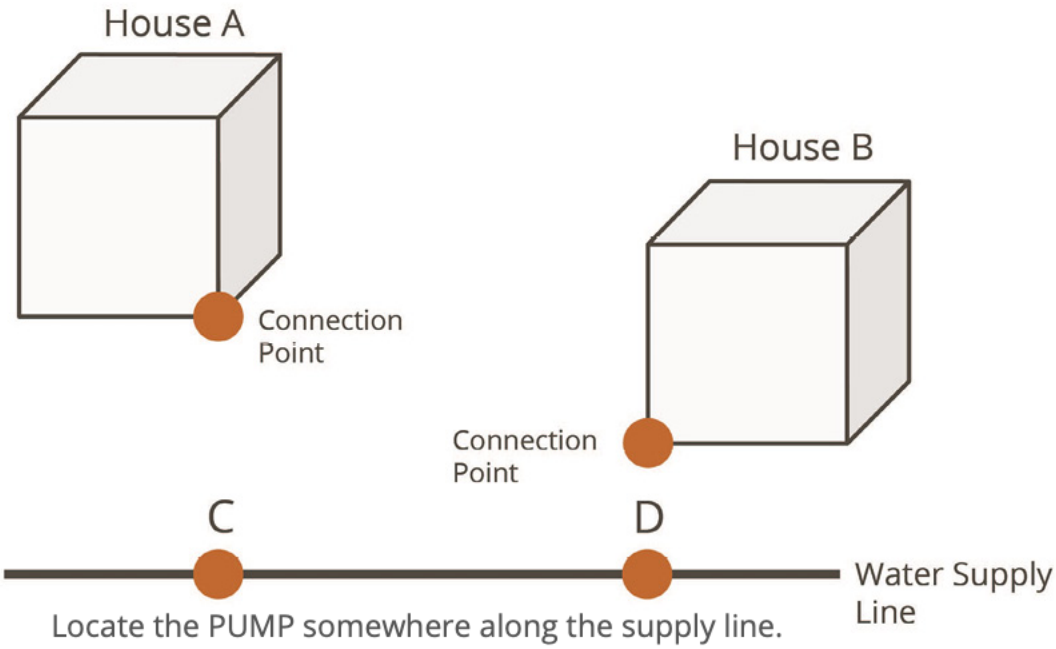
Exploration 0.1.1: A Common Cube Conundrum



Suppose one desired to move along the surface of the cube from the top far corner (point A) to the near bottom corner (point B). Would the dark line path marked in the picture be the shortest route from point A to point B? If you agree, justify your answer. If you do not agree, describe the shortest path and justify your answer. Is the shortest path solution that you have chosen unique?

Exploration 0.1.2: The Efficient Waterline

The city wishes to connect two houses to an existing water supply line using a single pump at the supply line and a minimal amount of pipe extended to each house. The houses are located at different distances from the street (as pictured). In the interval from C to D, where should the pump connection be located on the supply line? Of course, you must justify your answer. Assume C and D are located directly beneath the connection point on houses A and B respectively.



As mentioned previously, it is important that you also make connections between mathematics concepts you are asked to remember and that you newly learn in this course. The next Exploration is a good example of making connections between topics and concepts in mathematics.

Exploration 0.1.3: Making Connections

Given the three topics listed below, devise a visual, verbal, and algebraic way of connecting the concepts:

1. The distance formula
2. The standard equation of a circle (not centered at the origin)
3. The Pythagorean Theorem

This Exploration is a good precursor for the topic of trigonometry based on triangle relationships on the Unit Circle. You will learn about this in a later Unit of the text.